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OFF-FARM AGRICULTURAL OCCUPATIONS IN PENNSYLVANIA, EMPLOYMENT OPPORTUNITIES AND TECHNICAL EDUCATION NEEDS.

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OBJECTIVES WERE--(1) TO IDENTIFY AGRICULTURAL OCCUPATIONS AND JOB TITLES IN PENNSYLVANIA AND TO ESTIMATE THE CURRENT NUMBER OF EMPLOYEES AND ANNUAL ENTRY OPPORTUNITIES, (2) TO LIST COMPETENCIES NEEDED FOR ENTRY AND ADVANCEMENT AND TO DETERMINE JOB CHARACTERISTICS SUCH AS SALARY, REQUIRED EDUCATION AND EXPERIENCE, AND DESIRED RESIDENTIAL BACKGROUND, AND (3) TO GROUP JOB TITLES BY COMPETENCIES. DATA WERE OBTAINED BY INTERVIEWING MANAGEMENT PERSONNEL OF 1,440 BUSINESSES AND SERVICES IN 29 PENNSYLVANIA COUNTIES. SOME FINDINGS WERE--(1) EMPLOYERS EXPECT A 14 PERCENT INCREASE IN THE NUMBER OF EMPLOYEES NEEDING AGRICULTURAL COMPETENCIES IN THE NEXT 5 YEARS, (2) THREE OCCUPATIONAL AREAS, AGRICULTURAL SUPPLIES AND EQUIPMENT, LIVESTOCK, DAIRY, AND POULTRY PRODUCTS, AND ORNAMENTAL HORTICULTURE, ACCOUNT FOR 74 PERCENT OF THE BUSINESSES, AND (3) TO PROVIDE TRAINED PERSONS, EACH SCHOOL TEACHING AGRICULTURE WILL HAVE TO PROVIDE 12 GRADUATES FOR FULL-TIME EMPLOYMENT AND SIX GRADUATES FOR PART-TIME EMPLOYMENT PER YEAR. TABULAR DATA INCLUDE JOB TITLES BY OCCUPATIONAL FAMILIES, LEVELS OF TRAINING BY COMPETENCY FACTORS NEEDED TO ADVANCE IN THE OCCUPATIONS, PREFERRED RESIDENTIAL BACKGROUND AND EDUCATIONAL LEVEL DESIRED OF NEW EMPLOYEES, AND ANNUAL SALARY BY OCCUPATIONAL LEVEL OF EMPLOYMENT. (PS)

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# OFF-FARM AGRICULTURAL OCCUPATIONS IN PENNSYLVANIA

Agricultural Mechanics

Agricultural Supplies

Agricultural Products

Ornamental Horticulture

Forestry

Agricultural Resources

## Employment Opportunities and Technical Education Needs

Teacher Education Research Series, Volume 7, Number 1, 1966

by Norman K. Hoover, David R. McClay, Glenn Z. Stevens

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VT000402

# FOREWORD

This study of employment opportunities and technical education needs for workers in off-farm agricultural occupations was a cooperative effort by the Department of Agricultural Education, The Pennsylvania State University, and the Division of Agricultural Education, the Pennsylvania State Department of Public Instruction.

The project was initiated by the Department of Agricultural Education, The Pennsylvania State University, as Agricultural Experiment Station Project No. 1483. Project leaders were N. K. Hoover, D. R. McClay, and G. Z. Stevens. A grant was obtained from the Bureau of Technical and Continuing Education, Pennsylvania Department of Public Instruction, to help finance the project. Area Agricultural Education Advisers organized the work at the county level and teachers of agriculture conducted most of the interviews for collecting data.

The project leaders acknowledge assistance given by the following:

Division of Agricultural Education, Pennsylvania Department of Public Instruction.

Bureau of Employment Security, Pennsylvania Department of Labor and Industry.

Area Agricultural Education Advisers and Teachers of Agriculture

Pennsylvania Department of Agriculture

Personnel of the State and Federal Government Agencies who provided data for the study at the State level.

Members of the County Selection Committee for each of the counties who assisted with compiling the list of businesses for their respective counties.

The managers of businesses who gave freely of their time for the interviews.

Graduate Assistants in Agricultural Education, Ivan C. McGee, Robert E. Steffy, E. Lamar Love, Charles W. Smith and William I. Lindley.

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# INTRODUCTION

New programs are needed in agricultural education because phenomenal changes have taken place in the agricultural industry in recent years. A multitude of off-farm agricultural businesses and services has emerged to aid farmers and ranchers. Many employees in these businesses and services require knowledge and skills similar to those needed in production agriculture. The rural-urban complex of our society also has undergone phenomenal changes which have implications for employees in ornamental horticulture and agricultural resources who require knowledge and skills in plant, soil, and animal sciences.

Agricultural leaders for a decade have known that agriculture and farming are no longer synonymous. Recognition of this fact was reflected through research, in professional magazine articles, in professional papers presented at conferences, and through other communication media. The concept culminated in the summary report of the President's Panel of Consultants on Vocational Education. It recommended that:

> The vocational agriculture program, under Federal reimbursement, should be broadened to include instruction and increased emphasis of management, finance, farm mechanization, conservation, forestry, transportation, processing, marketing the products of the farm, and other similar topics.

Congress, in 1963, recognized that agriculture is more than farming by implementing the recommendation of the President's Panel of Consultants in PL 88-210. The Act states in Section 10b:

> Any amounts allotted (or apportioned) under such titles, Act, or Acts for agriculture may be used for vocational education in any occupation involving knowledge and skills in agricultural subjects, whether or not such occupation involves work of the farm or of the farm home, and such education may be provided without directed or supervised practice on a farm.

The Federal legislation needed to develop new programs in agriculture was supplemented by the Pennsylvania State Legislature in 1963. Act 463 provides for further expansion of vocational-technical education through area schools and technical institutes. Act 484, known as the Community College Act, provides for technical education in Community Colleges.

## Purpose of the Study

The purpose of the Study was to obtain information for occupational guidance in agriculture and for planning new programs in agricultural education. Specific objectives of the study were:

1. To identify agricultural occupations and job titles in Pennsylvania and to estimate the current number of employees and annual entry opportunities.
2. To list competencies needed for entry and advancement and to determine job characteristics such as salary, required education and experience, desired residential background, and other related information.
3. To group or cluster job titles by competencies for common educational purposes and to determine instructional areas in agriculture.

## Procedure

Agricultural occupations may be defined as those occupations in which workers need competencies in one or more of the primary areas of plant science, animal science, agricultural business management and marketing, and agricultural mechanization. Information about these occupations was secured by use of a survey form through personal interviews with qualified persons in businesses and services that have employees who need agricultural competencies.

The following 29 selected Pennsylvania Counties were surveyed in order to obtain the desired data:

Adams
Armstrong
Berks
Bedford
Blair
Bucks
Butler
Chester
Clarion
Crawford
Cumberland
Dauphin
Erie
Franklin
Fulton
Indiana
Lancaster
Lawrence
Lehigh
Lebanon
Mercer
Mifflin
Montgomery
Schuylkill
Snyder
Somerset
Union
Venango
Westmoreland

A list of all businesses in these counties was obtained from the Bureau of Employment Security, Pennsylvania Department of Labor and Industry. A County Selection Committee in each county made up of representatives from agriculture teachers, Agricultural Extension, County School Office, Chamber of Commerce, County Commissioners, agricultural businesses, non-agricultural businesses, school administrators, guidance counselors, and local Bureau of Employment Security personnel was appointed by the area agricultural education adviser. This committee selected those businesses that were thought to have employees who needed agricultural competencies and added other businesses and services that were not included in the Bureau of Employment Security list.

Businesses and services identified by the County Selection Committee were categorized into occupational families with sub-divisions within the families. For example the Agricultural Supplies family had sub-divisions of: feed and supplies, farm and garden supplies, hardware stores, bulk spreading of lime and fertilizer, gasoline and oil distribution, agricultural chemical manufacturing, and feed manufacturing.

Data were obtained by teachers of agriculture and area advisers who interviewed a random sample by sub-divisions of the businesses and services identified by the County Selection Committee. Additional data were obtained by interviews with persons at the State level who provided information for the following businesses or services for the state as a whole:

State Government
- Department of Agriculture
- Game Commission
- Fish Commission
- Department of Justice
- Department of Labor and Industry
- Department of Forestry and Waters
- Department of Public Instruction
- Department of Military Affairs
- Department of Highways
- Department of Property and Supplies
- Department of Public Welfare
- Department of Health
- State Police Commission
- Historical and Museum Commission

Agricultural Stabilization and Conservation Service
Soil Conservation Service
United States Department of Agriculture
Private Practicing Veterinarians
Teachers of Vocational Agriculture and Supervisory Staff
College of Agriculture, The Pennsylvania State University
Farm Credit Administration
Pennsylvania Farmers Association
Dairy Laboratory Directors
Pennsylvania Milk Control Commission
Dairy Herd Improvement Association
Pennsylvania Artificial Breeding Cooperatives
Farm Machinery Personnel
(working independently of retail sales and services)
Chemical Company Personnel
(working independently of retail businesses)

Seventeen counties were surveyed in 1964 and a preliminary report was published. The last twelve counties were surveyed in 1965. This publication is a final report of the 29 counties studied and a projection of these data to state estimates. The number of businesses interviewed in the 29 counties varied according to the occupational family and the number of businesses in a family. The number and per cent of businesses surveyed are presented below in tabular form.

| Occupational Family | No. Businesses and Services | No. Interviewed | Per Cent Interviewed Within Family |
|---|---|---|---|
| Ag. Supplies and Equipment | 1,014 | 319 | 32* |
| Ag. Machinery Sales and Services | 386 | 137 | 36 |
| Livestock, Dairy and Poultry Products | 842 | 278 | 33 |
| Fruits, Vegetables, Crops and Forestry Products | 391 | 144 | 37 |
| Ornamental Horticulture | 1,403 | 427 | 30 |
| Agricultural Resources | 121 | 62 | 51 |
| Agricultural Services | 258 | 73 | 28 |
| Total | 4,415 | 1,440 | 33 |

* Percentages have been rounded to the nearest whole number.

## PRESENTATION OF DATA

Data for this study were obtained by interviewing management personnel of 1,440 businesses and services in 29 Pennsylvania counties. Additional data were obtained from personnel representing State level agencies and services. All percentages in the report have been rounded to the nearest whole number.

Businesses and services that employ persons needing agricultural competencies were categorized into seven occupational families as shown in Table 1. An analysis of Table 1 shows that there were 4,415 businesses and services employing a total of 75,669 persons. Of these, 34,850, or 46 per cent, needed agricultural competencies to be proficient in their work. Three occupational families -- Ag. Supplies and Equipment, Livestock, Dairy and Poultry Products, and Ornamental Horticulture -- account for 74 per cent of the 4,415 businesses.

### Employment, Employment Opportunities and Related Information

In this phase of the study of off-farm agricultural occupations in 29 Pennsylvania Counties, 163 job titles were identified. Specific information obtained about these job titles was:

1. Number of current employees needing agricultural competencies.
2. Number of employees expected five years hence.
3. Number of employees to be hired during the next five years.
4. Salary data by job titles.
5. Preferred residential background.
6. Educational level desired for entry and for advancement.

TABLE 1

NUMBER OF AGRICULTURAL BUSINESSES AND SERVICES,
ESTIMATED PERSONS EMPLOYED BY OCCUPATIONAL FAMILY,
SUMMARY FOR 29 COUNTIES

| Occupational Family | No. Businesses and Services | All Persons Employed | Employees Needing Agricultural Competencies | |
|---|---|---|---|---|
| | | | Number | Per Cent |
| Ag. Supplies and Equipment | 1,014 | 13,235 | 7,111 | 20 |
| Ag. Machinery Sales and Service | 386 | 5,132 | 2,626 | 8 |
| Livestock, Dairy and Poultry Products | 842 | 18,523 | 9,194 | 26 |
| Fruits, Vegetables, Crops and Forestry Products | 391 | 10,494 | 2,901 | 8 |
| Ornamental Horticulture | 1,403 | 21,391 | 9,307 | 27 |
| Agricultural Resources | 121 | 990 | 1,247 | 4 |
| Agricultural Services | 258 | 5,904 | 2,464 | 7 |
| Totals | 4,415 | 75,669 | 34,850 | 100 |

Employment and Employment Opportunities

The number of current employees, the number expected five years hence, and number of employees to be hired during the next five years are shown in Table 2. A total of 34,850 employees needed agricultural competencies; 27,720, or 80 per cent, were full-time employees and 7,130, or 20 per cent, were part-time employees. These same businesses expected to have a total of 37,795 employees five years hence. This would be an increase of 2,945 employees of which 80 per cent would be full-time employees.

Employers expect to hire an estimated 12,171 employees during the next five years. This number reflects the expected growth in size of business and the turnover. Of the 12,171 persons expected to be hired, 7,880, or 65 per cent, would be full-time employees.

There were 136 departments of vocational agriculture in the 29 counties studied. If persons to be hired during the next five years were to have some technical education in agriculture, each department would have to provide 12 graduates for full-time employment and 6 graduates for part-time employment per year.

Table 2 also shows that three occupational families -- Ag. Supplies and Equipment, Livestock, Dairy and Poultry Products, and Ornamental Horticulture -- account for 25,612, or 73 per cent, of the 34,850 employees who need agricultural competencies, 27,620, or 73 per cent, of the 37,795 anticipated employees five years hence, and 8,582, or 71 per cent, of the 12,171 employees to be hired during the next five years.

TABLE 2

ESTIMATED NUMBER OF EMPLOYEES NEEDING AGRICULTURAL COMPETENCIES, CURRENT, EXPECTED FIVE YEARS FROM NOW, AND TO BE HIRED IN NEXT FIVE YEARS, IN AGRICULTURAL BUSINESSES AND SERVICES, BY OCCUPATIONAL FAMILY, SUMMARY FOR 29 COUNTIES

| | Employees Needing Agricultural Competencies | | | | | |
|---|---|---|---|---|---|---|
| | Current | | Expected 5 Years From Now | | To Be Hired in Next 5 Years | |
| Occupational Family | Total | Per Cent Full-time | Total | Per Cent Full-time | Total | Per Cent Full-time |
| Ag. Supplies and Equipment | 7,111 | 91 | 7,693 | 90 | 2,663 | 88 |
| Ag. Machinery Sales and Service | 2,626 | 92 | 3,051 | 94 | 1,049 | 93 |
| Livestock, Dairy and Poultry Products | 9,194 | 82 | 9,354 | 85 | 1,708 | 80 |
| Fruits, Vegetables, Crops and Forestry Products | 2,901 | 91 | 3,109 | 88 | 917 | 87 |
| Ornamental Horticulture | 9,307 | 62 | 10,573 | 63 | 4,211 | 28 |
| Agricultural Resources | 1,247 | 76 | 1,434 | 72 | 766 | 70 |
| Agricultural Services | 2,464 | 76 | 2,581 | 75 | 857 | 81 |
| Totals | 34,850 | 80 | 37,795 | 80 | 12,171 | 65 |

Employees, in addition to being categorized into six occupational families, were further categorized by "level of employment." The levels of employment were: professional, managerial, technical, sales, clerical, and service. "Service," as a term denoting level of employment, is used as the 1965 revision of Dictionary of Occupational Titles uses it; namely, skilled, semi-skilled, and unskilled occupations.

Table 3 shows the number of employees who need agricultural competencies by level of employment. The service level of employment accounted for 60 per cent of all employees in the twenty-nine counties. Managerial level and sales level of employment accounted for an additional 26 per cent of the employees. Professional, technical, and clerical accounted for the remaining 14 per cent. There was approximately 1 professional employee for every 14 full-time employees and 1 manager for every 6 full-time employees.

Median Salaries of New Employees

Employers were asked in the interview to indicate the beginning wage or salary and the highest wage or salary for each job title in their respective businesses. The wages or salaries, whether reported by the hour, week or month, were converted to annual salaries.

Employees in off-farm agricultural occupations had a wide range of annual median salaries. Table 4 shows the median salaries of beginning employees by occupational family and level of employment and Table 5 shows the highest median salaries by occupational family and level of employment.

TABLE 3

ESTIMATED NUMBER OF PERSONS EMPLOYED WHO NEED AGRICULTURAL COMPETENCIES IN SIX OCCUPATIONAL LEVELS OF EMPLOYMENT, SUMMARY FOR 29 COUNTIES

| Occupational Family | Number of Persons by Occupational Level of Employment | | | | | | |
|---|---|---|---|---|---|---|---|
| | Profes-sional | Mana-gerial | Tech-nical | Sales | Clerical | Serv-ice | Total |
| Ag. Supplies and Equipment | 74 | 1,430 | 180 | 1,126 | 425 | 3,876 | 7,111 |
| Ag. Machinery Sales and Service | 233 | 530 | 18 | 322 | 121 | 1,402 | 2,626 |
| Livestock, Dairy and Poultry Products | 512 | 1,056 | 416 | 1,731 | 230 | 5,249 | 9,194 |
| Fruits, Vegetables, Crops and Forestry Products | 194 | 434 | 132 | 201 | 13 | 1,927 | 2,901 |
| Ornamental Horticulture | 68 | 1,181 | 204 | 580 | 61 | 7,213 | 9,307 |
| Agricultural Resources | 117 | 204 | 37 | 2 | 16 | 871 | 1,247 |
| Agricultural Services | 812 | 164 | 645 | 244 | 51 | 548 | 2,464 |
| Totals | 2,010 | 4,999 | 1,632 | 4,206 | 917 | 21,086 | 34,850 |
| Per Cent | 6 | 14 | 5 | 12 | 3 | 60 | 100 |

Beginning median salaries ranged from a low of $2,583 for service level of employment in the Fruits, Vegetables, Crops, and Forestry Products family to a high of $7,805 for professional level of employment in the Ag. Supplies and Equipment family. These median salaries were reported as the salaries that persons entering jobs, by level of employment and by occupational family, could expect to receive at the time they entered.

The professional level of employment had the highest median salary for employees entering jobs and the clerical and service level of employment had the lowest median salaries. Beginning salaries of managerial, technical, and sales level of employment tended to be higher than clerical and service level of employment.

The median salary range for highest annual salary, Table 5, ranged from $2,998 for service level of employment in the Fruits, Vegetables, Crops, and Forestry family to $20,036 for professional employees in the Agricultural Service family. Median salaries were higher for those levels of employment which required more technical education.

Desired Residential Background of New Employees

Residential background, as a factor in employability of persons in off-farm agricultural occupations, was designated as farm, rural non-farm, urban, and no preference.

Table 6 shows the preferred residential background of new employees by employers. Farm reared employees were preferred by 53 per cent of the employers, 14 per cent preferred rural non-farm employees, 1 per cent preferred urban employees, and 32 per cent had no preference for residential background.

TABLE 4

MEDIAN BEGINNING ANNUAL SALARIES OF EMPLOYEES WHO NEED AGRICULTURAL COMPETENCIES BY OCCUPATIONAL LEVEL OF EMPLOYMENT, SUMMARY FOR 29 COUNTIES

| Occupational Family | Median Beginning Annual Salary by Occupational Level of Employment | | | | | |
|---|---|---|---|---|---|---|
| | Professional | Managerial | Technical | Sales | Clerical | Services |
| Ag. Supplies and Equipment | $7,805<br>67* | $4,826<br>355 | $5,820<br>47 | $4,276<br>245 | $2,970<br>71 | $3,473<br>953 |
| Ag. Machinery Sales and Service | $7,428<br>96 | $4,695<br>114 | $5,327<br>21 | $4,196<br>51 | $3,249<br>27 | $3,508<br>361 |
| Livestock, Dairy and Poultry Products | $5,825<br>524 | $5,620<br>248 | $5,044<br>68 | $4,649<br>221 | $3,990<br>34 | $3,513<br>930 |
| Fruits, Vegetables, Crops and Forestry Products | $5,321<br>346 | $5,117<br>69 | $5,187<br>9 | $6,163<br>51 | $2,874<br>5 | $2,583<br>496 |
| Ornamental Horticulture | $6,666<br>14 | $5,523<br>414 | $3,482<br>35 | $4,030<br>130 | $3,555<br>28 | $3,765<br>1809 |
| Agricultural Resources | $5,262<br>201 | $4,449<br>15 | 0<br>0 | 0<br>0 | $3,249<br>7 | $3,318<br>134 |
| Agricultural Service | $7,041<br>1656 | $5,695<br>27 | $2,929<br>43 | $6,332<br>34 | $3,249<br>3 | $3,999<br>54 |

* The figures below each median salary are the number of job titles for which employers reported a beginning salary.

TABLE 5

MEDIAN HIGHEST ANNUAL SALARIES OF EMPLOYEES WHO NEED AGRICULTURAL COMPETENCIES BY OCCUPATIONAL LEVEL OF EMPLOYMENT, SUMMARY FOR 29 COUNTIES

| Occupational Family | Median Highest Annual Salary by Occupational Level of Employment | | | | | |
|---|---|---|---|---|---|---|
| | Professional | Managerial | Technical | Sales | Clerical | Services |
| Ag. Supplies and Equipment | $12,142<br>70* | $6,486<br>330 | $6,772<br>42 | $4,488<br>553 | $3,916<br>77 | $4,575<br>622 |
| Ag. Machinery Sales and Service | $10,202<br>85 | $6,116<br>123 | $6,346<br>18 | $5,500<br>26 | $4,300<br>26 | $5,374<br>367 |
| Livestock, Dairy and Poultry Products | $10,257<br>443 | $9,156<br>283 | $6,316<br>59 | $5,225<br>396 | $6,213<br>37 | $5,633<br>906 |
| Fruits, Vegetables, Crops and Forestry Products | $11,950<br>345 | $7,468<br>69 | $11,607<br>11 | $9,338<br>49 | $6,490<br>6 | $2,998<br>445 |
| Ornamental Horticulture | $9,187<br>15 | $8,200<br>380 | $5,833<br>22 | $5,031<br>123 | $5,999<br>18 | $7,971<br>2122 |
| Agricultural Resources | $9,780<br>202 | $8,333<br>10 | 0<br>0 | 0<br>0 | $3,812<br>7 | $5,374<br>112 |
| Agricultural Service | $20,036<br>1789 | $6,428<br>27 | $4,750<br>43 | $8,166<br>38 | $4,374<br>3 | $5,799<br>68 |

* The figures below each median salary are the numbers of job titles for which employers reported a highest salary.

Employers in approximately one-third of the ornamental horticulture and agricultural resources businesses preferred farm reared employees whereas employers in the remaining occupational families had a higher preference for farm reared employees with a range from 51 to 76 per cent. These data indicate that farm and rural non-farm reared youth have a definite advantage over prospective employees from urban areas for those occupations that are farm related.

Employers in 49 per cent of the horticulture businesses had no preference of employee background. This may be explained by the fact that this occupational family, while involving plant science, primarily is not farm related.

Desired Educational Level for New Employees

The employers were asked to indicate the educational level that they desired of new employees for initial employment in their businesses. These data are shown by occupational families in Table 7.

A summary of 29 counties shows that 337, or 11 per cent, of the employers have one or more job titles for which they would employ persons with less than a high school education and 1,561, or 57 per cent, have job titles for which they would employ persons with only a high school education. There were 404, or 14 per cent, employers who wanted some employees with technical education and 304, or 10 per cent, who wanted some employees with a college education. Two hundred and forty, or 9 per cent, of the businesses wanted some employees with at least a bachelors degree for initial employment.

TABLE 6

RESIDENTIAL BACKGROUND OF NEW EMPLOYEES PREFERRED FOR INITIAL EMPLOYMENT BY OCCUPATIONAL FAMILY AS EXPRESSED BY EMPLOYERS INTERVIEWED

| Occupational Family | Number of Job Titles | Percentage Distribution by Residential Background Preferred: Farm Per Cent | Rural Non-Farm Per Cent | Urban Per Cent | No Preference Per Cent |
|---|---|---|---|---|---|
| Ag. Supplies and Equipment | 651 | 68 | 13 | 1 | 17 |
| Ag. Machinery Sales and Services | 289 | 76 | 17 | 2 | 5 |
| Livestock, Dairy and Poultry Products | 416 | 51 | 11 | 2 | 36 |
| Fruits, Vegetables, Crops and Forestry Products | 249 | 51 | 14 | 0.4 | 35 |
| Ornamental Horticulture | 811 | 36 | 14 | 1 | 49 |
| Agricultural Resources | 75 | 39 | 20 | 0 | 41 |
| Agricultural Services | 131 | 62 | 12 | 2 | 24 |

TABLE 7

EDUCATION LEVEL OF NEW EMPLOYEES DESIRED FOR
INITIAL EMPLOYMENT BY OCCUPATIONAL FAMILY
AS EXPRESSED BY EMPLOYERS INTERVIEWED

| Occupational Family | Number of Job Titles | Percentage Distribution of Job Titles by Educational Level Desired: Less Than H. S. Per Cent | H. S. Grad. Per Cent | Tech. Ed. Per Cent | Some College Per Cent | Bachelor Degree or Higher Per Cent |
|---|---|---|---|---|---|---|
| Ag. Supplies and Equipment | 678 | 6 | 62 | 11 | 11 | 10 |
| Ag. Machinery Sales and Service | 343 | 5 | 64 | 16 | 9 | 5 |
| Livestock, Dairy and Poultry Products | 480 | 13 | 51 | 15 | 10 | 11 |
| Fruits, Vegetables, Crops and Forestry Products | 310 | 13 | 51 | 22 | 5 | 9 |
| Ornamental Horticulture | 811 | 18 | 50 | 12 | 13 | 8 |
| Agricultural Resources | 91 | 26 | 44 | 10 | 15 | 4 |
| Agricultural Services | 139 | 7 | 52 | 17 | 12 | 13 |

## Estimates for Pennsylvania by Counties of Employees Needing Agricultural Competencies

The agricultural occupations study for 29 Pennsylvania counties provided an estimate of the number of off-farm agricultural employees in Pennsylvania. In the next phase of the study the data obtained were used as a basis for estimating the number of off-farm agricultural employees in each of the other 38 counties.

To estimate the number of off-farm agricultural employees, it was necessary to find items of information that have a positive, linear relationship with the number of workers needing agricultural competencies. One of these items, the number of businesses employing workers needing agricultural competencies, was determined for the 38 counties not surveyed by County Selection Committees. The procedure was the same as that used for the 29 counties. Seventeen other items of agricultural information for each county, taken from the Pennsylvania Crop Reporting Statistics, were:

1. Proportion of county land in farms
2. Number of farms
3. Average value of land and buildings per acre
4. Motor trucks on farms
5. Tractors on farms
6. Average number of dairy cows per farm
7. Average number of beef cattle per farm
8. Average number of hogs per farm
9. Average number of sheep per farm

10. Average number of chickens per farm
11. Value of all field crops
12. Forest products sales
13. Nursery products sales
14. Maple syrup production
15. Total cash crops, all commodities
16. Value of commercial fertilizer used
17. Value of lime used

By linear regression procedures, coefficients were computed for each of the variables. The multiple regression equation from the data for the 29 counties surveyed was used to estimate for each county the total number needing agricultural competencies. Part-time current employees and employees to be hired during the next five years were estimated from the ratio of these groups to full-time current employees in the 29-county summary. Table 8 shows the estimates for Pennsylvania by counties for current employees and employees to be hired during the next five years.

TABLE 8

ESTIMATED NUMBER OF EMPLOYEES WHO NEED AGRICULTURAL COMPETENCIES, BY COUNTIES FOR PENNSYLVANIA, CURRENT AND TO BE HIRED DURING THE NEXT 5 YEARS

| County | Employees Needing Agricultural Competencies | | | |
|---|---|---|---|---|
| | Current | | To Be Hired In Next 5 Years | |
| | Full-time | Part-time | Full-time | Part-time |
| Adams | 798 | 182 | 256 | 109 |
| Allegheny | 1,655 | 824 | 514 | 653 |
| Armstrong | 482 | 128 | 201 | 63 |
| Beaver | 732 | 221 | 222 | 132 |
| Bedford | 450 | 196 | 218 | 126 |
| Berks | 1,234 | 570 | 651 | 178 |
| Blair | 896 | 346 | 350 | 310 |
| Bradford | 366 | 85 | 131 | 46 |
| Bucks | 1,496 | 283 | 194 | 135 |
| Butler | 840 | 198 | 150 | 30 |
| Cambria | 494 | 127 | 171 | 75 |
| Cameron | 196 | 50 | 73 | 25 |
| Carbon | 394 | 123 | 133 | 78 |
| Centre | 530 | 109 | 190 | 58 |
| Chester | 2,378 | 351 | 672 | 489 |
| Clarion | 532 | 151 | 175 | 92 |
| Clearfield | 494 | 109 | 173 | 57 |
| Clinton | 334 | 72 | 118 | 33 |
| Columbia | 844 | 243 | 275 | 153 |
| Crawford | 574 | 186 | 214 | 118 |
| Cumberland | 826 | 220 | 268 | 48 |
| Dauphin | 854 | 128 | 252 | 75 |
| Delaware | 1,342 | 592 | 409 | 446 |
| Elk | 258 | 61 | 94 | 28 |
| Erie | 541 | 357 | 190 | 287 |
| Fayette | 1,022 | 260 | 338 | 141 |
| Forest | 185 | 46 | 71 | 25 |
| Franklin | 724 | 184 | 238 | 68 |
| Fulton | 268 | 76 | 126 | 30 |
| Greene | 338 | 98 | 117 | 58 |
| Huntingdon | 481 | 99 | 162 | 42 |
| Indiana | 653 | 342 | 324 | 395 |
| Jefferson | 413 | 84 | 148 | 41 |
| Juniata | 461 | 95 | 146 | 38 |

TABLE 8 (continued)

| County | Employees Needing Agricultural Competencies | | | |
|---|---|---|---|---|
| | Current | | To Be Hired In Next 5 Years | |
| | Full-time | Part-time | Full-time | Part-time |
| Lackawanna | 1,671 | 655 | 506 | 467 |
| Lancaster | 3,785 | 795 | 1,451 | 402 |
| Lawrence | 514 | 338 | 106 | 94 |
| Lebanon | 1,056 | 170 | 225 | 33 |
| Lehigh | 1,416 | 243 | 159 | 161 |
| Luzerne | 1,032 | 313 | 304 | 188 |
| Lycoming | 542 | 117 | 191 | 66 |
| McKean | 525 | 119 | 184 | 63 |
| Mercer | 776 | 168 | 318 | 94 |
| Mifflin | 291 | 81 | 90 | 38 |
| Monroe | 713 | 234 | 233 | 158 |
| Montgomery | 2,615 | 601 | 677 | 302 |
| Montour | 264 | 72 | 91 | 39 |
| Northampton | 866 | 233 | 274 | 137 |
| Northumberland | 631 | 151 | 205 | 81 |
| Perry | 455 | 101 | 151 | 49 |
| Philadelphia | 368 | 152 | 123 | 109 |
| Pike | 235 | 81 | 85 | 51 |
| Potter | 320 | 72 | 118 | 38 |
| Schuylkill | 535 | 136 | 229 | 107 |
| Snyder | 376 | 98 | 156 | 26 |
| Somerset | 762 | 182 | 270 | 184 |
| Sullivan | 203 | 56 | 77 | 29 |
| Susquehanna | 462 | 115 | 159 | 64 |
| Tioga | 443 | 99 | 157 | 50 |
| Union | 266 | 82 | 152 | 58 |
| Venango | 176 | 66 | 52 | 18 |
| Warren | 406 | 111 | 144 | 67 |
| Washington | 1,134 | 322 | 363 | 204 |
| Wayne | 665 | 175 | 231 | 76 |
| Westmoreland | 850 | 246 | 210 | 166 |
| Wyoming | 400 | 96 | 141 | 52 |
| York | 1,266 | 292 | 417 | 173 |
| Totals | 50,104 | 13,968 | 16,213 | 8,526 |

## Classification of Job Titles for Off-Farm Agricultural Occupations

The persons needing agricultural competencies employed in 29 counties were classified under 163 job titles (Table 10). Of these, 40 job titles for "current full-time employees," 37 for "expected five years from now," and 30 "to be hired during the next five years" accounted for 75 per cent of all employees in these three categories. Table 9 shows that most of the job titles with the largest numbers of current workers will have the largest numbers five years from now and will account for the largest numbers to be hired within the next five years.

TABLE 9

JOB TITLES THAT ACCOUNT FOR 75 PER CENT OF ALL EMPLOYEES FOR CURRENT FULL-TIME EMPLOYEES, EXPECTED 5 YEARS FROM NOW, AND TO BE HIRED DURING THE NEXT 5 YEARS

| | Current Full-time Employees | Expected 5 Years from Now | To Be Hired During Next 5 Years |
|---|---|---|---|
| Agricultural Supplies and Equipment | | | |
| Ag. Supplies Manager | x | x | x |
| Ag. Supplies Fieldman | x | x | x |
| Ag. Supplies Bookkeeper | x | x | x |
| Ag. Supplies Product Salesman | x | x | x |
| Ag. Supplies Service Mechanic | x | x | x |
| Ag. Supplies Equipment Operator | x | x | x |
| Ag. Supplies Delivery Truck Driver | x | x | x |
| Ag. Supplies Sales Clerk | x | x | |
| Ag. Supplies Applicator | | | x |
| Agricultural Machinery Sales and Service | | | |
| Ag. Machinery Manager | x | x | |
| Ag. Machinery Salesman | x | x | x |
| Ag. Machinery Mechanic | x | x | x |
| Ag. Machinery Parts Manager | | | x |
| Ag. Machinery Engineer | | x | x |
| Ag. Machinery Fieldman | | x | x |

TABLE 9 (continued)

| | Current Full-time Employees | Expected 5 Years from Now | To Be Hired During Next 5 Years |
|---|---|---|---|
| Livestock, Dairy and Poultry Products | | | |
| Meat Processing Plant Manager | x | x | |
| Poultry Products Plant Manager | x | x | |
| Meat Processor | x | x | x |
| Poultry Processor | x | x | x |
| Meat and Poultry Products Salesman | x | x | |
| Stockyard Worker | x | x | |
| Dairy Products Plant Manager | x | x | |
| Dairy Products Lab. Technician | x | x | |
| Dairy Products Plant Worker | x | x | x |
| Dairy Products Driver Salesman | x | x | x |
| Dairy Products Plant Truck Driver | x | x | x |
| Dairy Products Plant Processor | x | | |
| Egg Candler | | | x |
| Livestock Buyer | x | | |
| Fruits, Vegetables, Crops and Forestry Products | | | |
| Fruit and Veg. Processing Worker | x | | |
| Crops Processing Worker | x | x | x |
| Forester | x | x | x |
| Forest Products Processor | x | x | x |
| Ornamental Horticulture | | | |
| Nursery Manager | x | x | |
| Park Superintendent | x | x | x |
| Nursery Grower | x | x | x |
| Nursery Worker | x | x | x |
| Greenskeeper | x | x | |
| Groundskeeper | x | x | x |
| Tree Pruner | x | x | x |
| Nursery Salesman | x | | |
| Floral Designer | x | | |
| Florist | x | x | |
| Agricultural Resources | | | |
| Animal Keeper | x | x | x |
| Agricultural Services | | | |
| Ag. Construction Worker | x | x | x |
| Dairy Herd Improvement Tester | ___ | ___ | x |
| | 40 | 37 | 30 |

TABLE 10

JOB TITLES BY OCCUPATIONAL FAMILIES FOR EMPLOYEES NEEDING AGRICULTURAL COMPETENCIES IN 29 COUNTIES

Agricultural Supplies and Equipment

| Job Titles | Current | | To Be Hired In Next 5 Years | |
|---|---|---|---|---|
| | Full-time | Part-time | Full-time | Part-time |
| Ag. Supplies Manager | 1,236 | 3 | 329 | 0 |
| Ag. Supplies Production Manager | 133 | 0 | 12 | 0 |
| Ag. Supplies Sales Manager | 58 | 0 | 18 | 0 |
| Ag. Supplies Service Manager | 24 | 0 | 0 | 0 |
| Ag. Supplies Office Manager | 38 | 0 | 8 | 0 |
| Ag. Supplies Research Director | 10 | 0 | 0 | 0 |
| Ag. Supplies Fieldman | 194 | 4 | 89 | 4 |
| Ag. Supplies Bookkeeper | 295 | 32 | 109 | 19 |
| Ag. Supplies Secretary | 27 | 3 | 3 | 0 |
| Ag. Supplies Product Salesman | 938 | 153 | 384 | 69 |
| Ag. Supplies Sales Clerk | 181 | 36 | 39 | 21 |
| Ag. Supplies Service Mechanic | 379 | 32 | 247 | 19 |
| Ag. Supplies Applicator | 132 | 46 | 79 | 20 |
| Ag. Supplies Equipment Operator | 1,891 | 267 | 561 | 144 |
| Ag. Supplies Delivery Truck Driver | 943 | 56 | 471 | 18 |

Agricultural Machinery Sales and Service

| | | | | |
|---|---|---|---|---|
| Ag. Machinery Manager | 449 | 2 | 53 | 0 |
| Ag. Machinery Service Manager | 61 | 0 | 12 | 0 |
| Ag. Machinery Parts Manager | 101 | 6 | 78 | 2 |
| Ag. Machinery Sales Manager | 63 | 0 | 5 | 0 |
| Ag. Machinery Office Manager | 34 | 4 | 5 | 4 |
| Ag. Machinery Engineer | 126 | 0 | 98 | 0 |
| Ag. Machinery Fieldman | 130 | 0 | 92 | 0 |
| Ag. Machinery Bookkeeper | 66 | 7 | 18 | 0 |
| Ag. Machinery Secretary | 15 | 8 | 0 | 0 |
| Ag. Machinery Office Clerk | 0 | 0 | 0 | 0 |
| Ag. Machinery Salesman | 202 | 30 | 93 | 6 |
| Ag. Machinery Sales Clerk | 0 | 0 | 0 | 0 |
| Ag. Machinery Mechanic | 797 | 68 | 397 | 36 |
| Ag. Machinery Mechanic's Helper | 33 | 23 | 33 | 16 |
| Ag. Machinery Field Mechanic | 92 | 11 | 29 | 0 |
| Ag. Machinery Welder | 50 | 10 | 6 | 0 |
| Ag. Machinery Parts Man | 111 | 4 | 27 | 0 |

TABLE 10 (continued)

| Job Titles | Current | | To Be Hired In Next 5 Years | |
|---|---|---|---|---|
| | Full-time | Part-time | Full-time | Part-time |
| Ag. Machinery Set Up Man | 44 | 24 | 16 | 4 |
| Ag. Machinery Warehouseman | 7 | 0 | 0 | 0 |
| Ag. Machinery Deliveryman | 44 | 4 | 15 | 4 |
| Agricultural Products: Livestock, Poultry and Dairy | | | | |
| Meat Processing Plant Manager | 383 | 4 | 14 | 4 |
| Poultry Products Plant Manager | 196 | 9 | 20 | 0 |
| Hatchery Manager | 99 | 3 | 17 | 0 |
| Livestock Market Manager | 101 | 15 | 0 | 3 |
| Meat and Poultry Products Sales Manager | 36 | 0 | 3 | 0 |
| Veterinarian, Meat Quality Control | 33 | 0 | 0 | 0 |
| Meat Grader | 98 | 0 | 18 | 0 |
| Poultry Grader | 40 | 0 | 6 | 0 |
| Meat Processor | 1,736 | 351 | 130 | 37 |
| Poultry Processor | 515 | 242 | 259 | 99 |
| Egg Candler | 117 | 36 | 75 | 30 |
| Meat Plant Worker | 27 | 0 | 3 | 0 |
| Meat and Poultry Products Salesman | 864 | 54 | 53 | 3 |
| Livestock Buyer | 154 | 54 | 24 | 7 |
| Poultry Buyer | 22 | 0 | 3 | 0 |
| Livestock Auction Secretary | 25 | 57 | 0 | 4 |
| Meat and Poultry Plant Bookkeeper | 28 | 10 | 6 | 0 |
| Stockyard Worker | 188 | 449 | 27 | 97 |
| Meat and Poultry Products Deliveryman | 134 | 11 | 70 | 7 |
| Hatchery Worker | 141 | 59 | 38 | 11 |
| Dairy Products Processing Plant Manager | 253 | 15 | 43 | 4 |
| Dairy Products Plant Production Manager | 71 | 0 | 3 | 0 |
| Dairy Products Sales Manager | 27 | 0 | 12 | 0 |
| Dairy Products Plant Fieldman | 29 | 0 | 8 | 0 |
| Dairy Products Laboratory Technician | 189 | 7 | 63 | 0 |
| Dairy Products Quality Control Technician | 54 | 0 | 3 | 0 |
| Dairy Products Plant Office Manager | 8 | 0 | 0 | 0 |
| Dairy Products Plant Bookkeeper | 21 | 6 | 3 | 0 |
| Dairy Products Plant Processing Supervisor | 133 | 8 | 18 | 8 |
| Dairy Products Plant Processor | 163 | 7 | 38 | 8 |
| Dairy Products Plant Worker | 418 | 146 | 82 | 3 |
| Dairy Products Salesman | 40 | 27 | 15 | 0 |

TABLE 10 (continued)

| Job Titles | Current | | To Be Hired In Next 5 Years | |
|---|---|---|---|---|
| | Full-time | Part-time | Full-time | Part-time |
| Dairy Products Driver Salesman | 925 | 0 | 161 | 0 |
| Dairy Products Plant Mechanic | 61 | 0 | 25 | 0 |
| Dairy Products Plant Truck Driver | 246 | 49 | 131 | 11 |
| **Agricultural Products: Fruits, Vegetables, Crops and Forestry Products** | | | | |
| Fruit and Veg. Market Manager | 70 | 4 | 17 | 0 |
| Fruit and Veg. Proc. Manager | 35 | 3 | 0 | 0 |
| Fruit and Veg. Sales Manager | 12 | 0 | 2 | 0 |
| Fruit and Veg. Product Manager | 12 | 0 | 3 | 0 |
| Fruit and Veg. Fieldman | 37 | 0 | 5 | 0 |
| Fruit and Veg. Quality Control Specialist | 8 | 3 | 0 | 3 |
| Fruit and Veg. Office Manager | 4 | 0 | 0 | 0 |
| Fruit and Veg. Salesman | 115 | 47 | 16 | 24 |
| Fruit and Veg. Proc. Plant Foreman | 25 | 6 | 6 | 0 |
| Fruit and Veg. Processing Worker | 217 | 14 | 23 | 4 |
| Fruit and Veg. Market Worker | 36 | 107 | 4 | 28 |
| Fruit and Veg. Buyer | 8 | 0 | 0 | 0 |
| Fruit and Veg. Inspector or Grader | 12 | 0 | 0 | 0 |
| Fruit and Veg. Truck Driver | 44 | 0 | 44 | 0 |
| Crops Marketing and Processing Manager | 75 | 0 | 42 | 0 |
| Crop Quality Control Specialist | 71 | 0 | 24 | 0 |
| Crops Marketing and Processing Salesman | 36 | 0 | 6 | 0 |
| Crops Processing Plant Foreman | 30 | 0 | 9 | 0 |
| Crops Marketing and Processing Bookkeeper | 3 | 0 | 3 | 0 |
| Crops Buyer | 3 | 0 | 3 | 0 |
| Crops Processing Worker | 636 | 30 | 309 | 36 |
| Forest Products Manager | 124 | 2 | 9 | 0 |
| Forester | 201 | 4 | 82 | 0 |
| Timber Inspector or Grader | 18 | 0 | 5 | 0 |
| Forest Products Processing Supervisor | 79 | 0 | 22 | 0 |
| Forest Products Sales Manager | 18 | 0 | 24 | 0 |
| Timber Buyer | 14 | 0 | 11 | 0 |
| Sawmill-Lumber Equipment Operator | 27 | 6 | 5 | 2 |
| Forest Products Processor | 206 | 39 | 122 | 7 |
| Forest Products Deliveryman | 51 | 9 | 2 | 15 |

TABLE 10 (continued)

| Ornamental Horticulture | Current | | To Be Hired In Next 5 Years | |
|---|---|---|---|---|
| Job Titles | Full-time | Part-time | Full-time | Part-time |
| Nursery Manager - Greenhouse Manager | 438 | 80 | 34 | 24 |
| Garden Center Manager | 87 | 0 | 10 | 0 |
| Orn. Horticulture Sales Manager | 7 | 0 | 0 | 0 |
| Florist | 181 | 6 | 12 | 8 |
| Park Superintendent | 227 | 10 | 122 | 8 |
| Tree Service Manager | 72 | 0 | 9 | 0 |
| Landscape Architect | 56 | 0 | 36 | 0 |
| Golf Course Superintendent | 102 | 3 | 16 | 0 |
| Orn. Horticulture Specialist | 22 | 4 | 5 | 0 |
| Landscape Consultant - Landscape Aid | 39 | 0 | 0 | 0 |
| Floral Designer | 143 | 65 | 17 | 40 |
| Ornamental Horticulture Bookkeeper | 49 | 12 | 2 | 0 |
| Nursery Salesman | 165 | 75 | 4 | 16 |
| Garden Center Salesman | 51 | 122 | 21 | 127 |
| Nursery Sales Clerk - Garden Center | 69 | 51 | 11 | 164 |
| Nursery Grower - Greenhouse Grower | 262 | 64 | 92 | 44 |
| Nursery Worker | 771 | 1,224 | 205 | 1,565 |
| Garden Center Mechanic | 39 | 21 | 6 | 36 |
| Greenskeeper | 441 | 603 | 52 | 376 |
| Groundskeeper | 2,045 | 1,108 | 428 | 632 |
| Tree Surgeon | 34 | 0 | 10 | 0 |
| Tree Pruner - Tree Pruner Helper | 430 | 68 | 77 | 0 |
| Ornamental Horticulture Truck Driver | 48 | 13 | 2 | 0 |
| **Agricultural Resources** | | | | |
| Recreation Farm and Business Manager | 74 | 25 | 0 | 24 |
| Soil Conservationist | 97 | 0 | 49 | 0 |
| Soil Conservation Technician | 31 | 0 | 28 | 0 |
| Soil Conservation Aid | 6 | 0 | 4 | 0 |
| Zookeeper | 6 | 10 | 4 | 5 |
| Aviary Manager | 3 | 3 | 1 | 1 |
| Fish Hatchery Manager | 6 | 0 | 2 | 0 |
| Wildlife Conservation Officer | 101 | 0 | 74 | 0 |
| Park Superintendent | 25 | 0 | 38 | 0 |
| Park Worker | 13 | 0 | 7 | 0 |
| Game Farm Worker | 116 | 5 | 31 | 7 |
| Animal Keeper | 470 | 188 | 282 | 185 |
| Camp Counselor | 5 | 63 | 0 | 24 |

TABLE 10 (continued)

Agricultural Services

| Job Titles | Current | | To Be Hired In Next 5 Years | |
|---|---|---|---|---|
| | Full-time | Part-time | Full-time | Part-time |
| Veterinarian | 0 | 0 | 0 | 0 |
| Artificial Breeding Technician | 128 | 0 | 50 | 2 |
| Dairy Herd Improvement Tester | 117 | 0 | 120 | 0 |
| Farm Auctioneer | 38 | 0 | 2 | 0 |
| Ag. Service Salesman | 42 | 6 | 11 | 0 |
| Blacksmith | 6 | 0 | 0 | 0 |
| Chick Sexer | 3 | 6 | 0 | 0 |
| Sprayer Operator | 33 | 5 | 22 | 10 |
| Farm Building Construction Manager | 44 | 0 | 10 | 0 |
| Ag. Construction Workers | 328 | 206 | 151 | 78 |
| Rural Electrification Employer | 70 | 0 | 8 | 0 |
| Bank Teller | 37 | 0 | 8 | 0 |
| Agricultural Consultant, Bank | 2 | 11 | 0 | 3 |
| Farm Appraiser | 25 | 0 | 3 | 0 |
| Farm Loan Officer | 39 | 0 | 4 | 0 |
| Public Accountant | 4 | 0 | 0 | 0 |
| Production Credit Manager | 34 | 0 | 15 | 0 |
| Farm Organization Fieldman | 11 | 0 | 4 | 0 |
| Breed Association Fieldman | 12 | 0 | 4 | 0 |
| Farm Insurance Specialist | 56 | 145 | 14 | 12 |
| County Agricultural Agent | 76 | 0 | 26 | 0 |
| Vocational Agriculture Instructor | 181 | 0 | 62 | 0 |
| Agricultural Journalist | 18 | 3 | 4 | 6 |
| Ag. Market Specialist | 9 | 0 | 5 | 2 |
| A. S. C. S. Compliance Supervisor | 42 | 26 | 15 | 11 |
| A. S. C. S. Field Reporter | 5 | 173 | 0 | 40 |

## Competency Areas in Which Off-Farm Agricultural Employees Need Technical Education

A major purpose of the study was to identify the clusters of competencies and job titles associated with entry and advancement in off-farm agricultural occupations. The specific occupational areas studied were: agricultural supplies, agricultural mechanics, food products, forestry, and ornamental horticulture.

There were 1691 separate job title interviews made with a random sample of employers in the 17 Pennsylvania counties initially surveyed. Factor analysis for competencies needed to enter and to advance in off-farm agricultural occupations was applied to the data as a descriptive, correlational technique. The list of 60 competencies was resolved into 11 factors that can readily be translated into major course content areas. The factors grouped into three areas are:

Competency factor groups in agriculture
- Plant science
- Animal science
- Agricultural mechanics
- Agricultural business management

Competency factor groups in business and distribution
- Business management and economics
- Sales and business skills
- Job and employee characteristics
- Employee-supervisor relations

Competency factor groups in trade and industry
- Building construction technology
- Industrial mechanics
- Industrial quality control

The factoring for job titles provided meaningful groups of job title factor groups by occupational areas as follows:

Agricultural Supplies Occupation Area
- Manager
- Salesman
- Bookkeeper
- Technician
- Service worker

Agricultural Mechanization Occupation Area
- Manager
- Salesman
- Parts manager
- Bookkeeper
- Mechanic

Food Products Occupation Area
- Manager
- Plant manager
- Salesman
- Livestock dealer
- Service worker

Forestry Occupation Area
- Manager
- Technician
- Grader
- Service worker

Ornamental Horticulture Occupation Area
- Manager
- Technician
- Service worker

Tables 11 through 15 show the most clearly defined competency factor groups and the several clusters of job titles for the five occupational areas. For the competency factor groups and job title groups in which employers indicated that the level of training from To Enter to To Advance should be increased, an asterisk is used.

TABLE 11

LEVELS OF TRAINING BY COMPETENCY FACTORS NEEDED TO ADVANCE IN OFF-FARM AGRICULTURAL SUPPLY OCCUPATIONS BY FACTORED JOB TITLE GROUPS

| Competency Factors | Levels of Training Needed by Factored Job Title Groups | | | | |
|---|---|---|---|---|---|
| | Manager | Sales-man | Book-keeper | Techni-cian | Service Worker |
| Plant Science | High | High* | Med.* | High* | High* |
| Animal Science | High | High* | Low | Low | High* |
| Agricultural Mechanics | High | High* | Low | Med. | Med. |
| Agricultural Business Management | High | High* | High | Med. | Med.* |
| Business Management and Economics | High* | Low | Low | Low | High* |
| Sales and Business Skills | High | High* | High | High* | High |
| Job and Employee Characteristics | High* | Low | Med. | Low | Med. |
| Employee-Supervisor Relations | High | High* | High | High | High |
| Building Construction Technology | Med. | High* | Low | Low | Low |
| Industrial Mechanics | Low | High* | Med.* | Med.* | Low |
| Industrial Quality Control | Med.* | High* | Low | Med.* | Med.* |

* Levels of training needed increased from To Enter to To Advance

TABLE 12

LEVELS OF TRAINING BY COMPETENCY FACTORS NEEDED TO ADVANCE IN OFF-FARM AGRICULTURAL MECHANICS OCCUPATIONS BY FACTORED JOB TITLE GROUPS

| | Levels of Training Needed By Factored Job Title Groups | | | | |
|---|---|---|---|---|---|
| Competency Factors | Manager | Sales-man | Parts Manager | Book-keeper | Mechanic |
| Plant Science | High | High | Low | Low | Med. |
| Animal Science | High | High | Low | Med.* | Med.* |
| Agricultural Mechanics | High | High | High | Med.* | High* |
| Agricultural Business Management | High | High | Med. | High | Med.* |
| Business Management and Economics | High | High | Med. | High* | High* |
| Sales and Business Skills | High | High* | Med. | High* | High* |
| Job and Employee Characteristics | High | High* | Med. | Med.* | Med. |
| Employee-Supervisor Relations | High | High* | High | Med. | High |
| Building Construction Technology | Low | High* | Med. | Low | Med. |
| Industrial Mechanics | High* | High* | Low | High* | High* |
| Industrial Quality Control | Low | Med.* | Low | Low | Med. |

* Levels of training needed increased from To Enter to To Advance

TABLE 13

LEVELS OF TRAINING BY COMPETENCY FACTORS NEEDED TO ADVANCE IN OFF-FARM FOOD PRODUCTS OCCUPATIONS BY FACTORED JOB TITLE GROUPS

| | Levels of Training Needed by Factored Job Title Groups | | | | |
|---|---|---|---|---|---|
| Competency Factors | Manager | Plant Manager | Sales-man | Livestock Dealer | Service Worker |
| Plant Science | Low | Low | Low | High* | Low |
| Animal Science | High | Med.* | High* | High* | Med. |
| Agricultural Mechanics | Med. | Low | Med.* | High* | Med. |
| Agricultural Business Management | High | Med.* | High* | High | Med.* |
| Business Management and Economics | High | Low | High | Med. | Med.* |
| Sales and Business Skills | High* | High* | High* | High* | Med.* |
| Job and Employee Characteristics | High | Med.* | High | High* | Low |
| Employee-Supervisor Relations | High | Med.* | High | High | High |
| Building Construction Technology | Med.* | Low | Low | Low | Med.* |
| Industrial Mechanics | Med.* | Med.* | Low | Low | Med.* |
| Industrial Quality Control | Med.* | Med.* | Low | Low | Med.* |

* Levels of training needed increased from To Enter to To Advance

TABLE 14

LEVELS OF TRAINING BY COMPETENCY FACTORS NEEDED TO ADVANCE IN OFF-FARM FORESTRY OCCUPATIONS BY FACTORED JOB TITLE GROUPS

| | Levels of Training Needed by Factored Job Title Groups | | | |
|---|---|---|---|---|
| Competency Factors | Manager | Technician | Grader | Service Worker |
| Plant Science | High* | Low | High | Med. |
| Animal Science | Low | Low | High* | Low |
| Agricultural Mechanics | High* | High* | High | Low |
| Agricultural Business Management | High* | Low | High | Low |
| Business Management and Economics | Low | Med.* | High | Med. |
| Sales and Business Skills | Med.* | Low | High* | High* |
| Job and Employee Characteristics | Low | Med. | High | Med.* |
| Employee-Supervisor Relations | High* | High | High | High |
| Building Construction Technology | Med.* | Med.* | High | Med.* |
| Industrial Mechanics | Low | High* | High | Low |
| Industrial Quality Control | Low | Low | High | Med.* |

* Levels of training needed increased from To Enter to To Advance

TABLE 15

LEVELS OF TRAINING BY COMPETENCY FACTORS NEEDED TO ADVANCE IN OFF-FARM ORNAMENTAL HORTICULTURE OCCUPATIONS BY FACTORED JOB TITLE GROUPS

| | Levels of Training Needed by Factored Job Title Groups | | |
|---|---|---|---|
| Competency Factors | Manager | Technician | Service Worker |
| Plant Science | High | High | High |
| Animal Science | Low | Low | Low |
| Agricultural Mechanics | Med.* | Med. | Low |
| Agricultural Business Management | High* | Med.* | Low |
| Business Management and Economics | High* | High* | Med.* |
| Sales and Business Skills | High* | High* | Med.* |
| Job and Employee Characteristics | Low | Med. | Low |
| Employee-Supervisor Relations | High | High | Med. |
| Building Construction Technology | Low | High* | Med.* |
| Industrial Mechanics | Low | High* | High* |
| Industrial Quality Control | Low | Med.* | Med.* |

* Levels of training needed increased from To Enter to To Advance

## SUMMARY OF THE STUDY

Generalizations that may be drawn from the findings are:

1. If persons to be hired during the next five years are to have some technical education in agriculture, each school teaching agriculture will have to provide 12 graduates for full-time employment and 6 graduates for part-time employment per year.
2. Employers expect about a fourteen per cent increase in the number of employees needing agricultural competencies in the next five years. This parallels the anticipated expansion in the total labor force.
3. Three occupational areas -- Agricultural Supplies and Equipment, Livestock, Dairy and Poultry Products, and Ornamental Horticulture -- account for 74 per cent of the businesses, 73 per cent of the current employees needing agricultural competencies, and 71 per cent of the employees to be hired in the next five years. Of 163 job titles, 37 account for 75 per cent of new employees, not including professional workers, in the next five years.
4. Agricultural competencies needed are mainly determined by the products handled by the business. Many of the agricultural subjects taught to students preparing for production farming also will be needed by students who enter off-farm agricultural occupations.
5. Salesmanship, human relations, and business management are competencies that are needed by all employees, but in varying degrees. There are many instances in which vocational agriculture may support, or be supported by, other vocational subjects taught.